Objective Use of EDR Data May Improve Highway Systems

- The data may aid in regulatory initiatives
- The data may aid in alleged defect investigations
- The data may aid in litigation cases
- The data may help in initiatives to improve driver behavior
- The data may aid law enforcement efforts
- May help determine dangerous traffic areas
- May help engineers design a safer car
- May help gather accurate statistics: Seat Belt Usage, etc.
- May lead to decreased vehicle prices
- May lead to deceased insurance rates
- May identify dangerous conditions and situations where additional safety devices could be used
- May provide information as to why some crashes are fatal and others are not
- May reduce the amount of crash testing in labs
- May become so ordinary that owners/driver will not know/care if it is present
- May provide better understanding as to how a driver responds to a crash (pre-crash)
- May provide better understanding as to how occupants in various positions respond
- May provide a better understanding of overall crash behavior
- May catch people who intentionally crash cars to collect insurance
- May determine the number of occupants within a vehicle and help cut down on insurance fraud
- May provide critical information that will determine causes of injuries and fatalities
- Will eventually allow us to better understand automobile crashes
- Will Make the Insurance Company’s Job Easier
- Will increase the safety of cars to be built in the future
- Will most likely increase seat belt usage
- Seat belts will save lives if increasingly worn with a an EDR sensor
- The speed of the vehicle at the time of the crash can be determined accurately-whereas before it could not
- We will have factual information instead of estimated data on police reports
- It may scare drivers resulting in safer driving knowing that they are being recorded
- Insurance reports may be more consistent
- Crashes without eyewitnesses will now have evidence
- Insurance fraud will be less frequent because all the facts of the accident will be on the record
- Drivers may maintain safer speeds
- Data can distinguish between two parties who disagree on what really happened
- Could help detect defective parts that cause crashes
- May assist doctors in understanding crash injuries
- May determine if the vehicle systems were all operating at the time of a crash
- Could determine if the driver was operating the vehicle in a reckless manner
- Could tell if the road conditions were poor
- Make people more aware of their vehicle
- May lead to improved occupant restraint systems
- May lead to improved air bag safety
- May determine if children were in-position or out-of-position
- May help locate stolen vehicles
- May provide an accurate number of daily, weekly, monthly, and yearly crashes in specific locations

- May provide a more realistic number of crashes that actually occur and are not reported
- May be tied into the defect/recall system of identifying unsafe products
- May help to reduce road rage behavior
- May aid in eliminating habitual drunk drivers from the highways
- May aid in school bus safety
- May provide exact time of crash
- May provide exact location of crash
- May provide actual seat belt usage
- May determine faulty systems
- May signal emergency response
- May cause the driver to drive more cautiously and considerately
- May Create New Industries and Jobs
    - ✓ People to manufacture the box
    - ✓ People to install the box
    - ✓ People to inspect and maintain
    - ✓ People to analyze the data
    - ✓ People to use the data when designing future vehicles, making safety standards, etc.
- Could Aid a Variety of Medical personnel (doctors, EMTs) in determining injuries the occupant suffered
- The data could be used in your favor and help defend your interests
- Used on a select population of at-risk drivers (teenagers) it may cut-down on irresponsible driving and save precious lives

Item 4 - White Paper, Forensic Accident Investigations, Inc.

Transportation Event Data Recorders

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ABSTRACT

Transportation safety has been significantly enhanced because of Event Data Recorders (EDR). National Transportation Safety Board (NTSB) transportation modes are defined as aviation, railway, marine, pipeline, and surface or highway. Highway EDR's include Original Equipment Manufacturer (OEM) *Type I* systems currently offered by General Motors and Ford and the *Type II* systems are currently offered by VDO, Eyewitness, and LMS. EDR's provide Δ V and other pertinent crash data. National Highway Traffic Safety Administration (NHTSA) has automobile, bus & truck special committees which have focused on EDR data and related protocol. Recorded data yield a more accurate assessment of the events leading up to an accident and corroborate witness statements, helping to eliminate much of the guesswork involved in accident investigation. NTSB held an International Symposium on Event Data Recorders in 1999 and then in 2000 followed up with a symposium dealing with Transportation Safety and the Law. Simply put EDR is the next revolution in transportation safety.

DEFINITION: EVENT DATA RECORDERS (EDR)

An on-board device capable of monitoring, recording and displaying pre-crash, crash and post-crash data element parameters from a vehicle, event & driver.

PURPOSE: EDR PARAMETER DATA ELEMENTS

The overall objective of utilizing EDR data is to increase the safety of our highway transportation system. Recorded data provides a more accurate assessment of events 1) leading up to an accident (pre-crash), 2) real time (crash) and 3) analysis (post-crash).

TRANSPORTATION MODES

Mode	Administration
Air	Federal Aviation Administration (FAA)
Sea	Maritime Administration (MARAD) and Coast Guard (USCG)
Rail	Federal Railroad Administration (FRA)
Pipeline	Research and Special Programs Administration (RSPA)
Highway (roads)	Federal Highway Administration (FHWA)
Highway (traffic)	National Highway Traffic Safety Administration (NHTSA)
Transit	Federal Transit Administration (FTA)

The National Transportation Safety Board (NTSB) has investigatory authority over all these of transportation issues, and thus investigates all modes of transportation accidents.

1. AVIATION DATA RECORDERS

Aviation systems have reduced current airline accidents to a rate of 1/16 what they were in 1960. Significant credit to this improvement in safety can be attributed to the black box or crash recorder which today is generically referred to as the Event Data Recorder or EDR. Aviation black boxes are painted orange however, and are referred to as Cockpit Voice Recorder (CVR) and Flight Data Recorder (FDR). Future aircraft will have two combined EDR's each with CVR & FDR data. Parallel data recorded on both units will provide higher levels of reliability with one unit mounted in the front of the aircraft and the second unit mounted in the aft section. Development of aviation data recorders is addressed in the Power Point slides prepared for this report.

2. RAIL DATA RECORDERS

In its railroad accident investigations, the National Transportation Safety Board (NTSB) relies on data recovered from recorders to determine train speed, direction of travel, distance traveled, throttle position, brake application, cab and/or wayside signals, and applicable communications from before and during an accident. Since 1995 the Federal Railroad Administration (FRA) has had the regulatory responsibility for establishing the minimum parameters to be recorded and the standards that event recorders must meet. The railroad industry also records information on train movements and warning devices for its own use.

Initially, railroads installed recorders and monitors on their locomotives as a way of overseeing the engineer's operation of the train and the locomotives operational performance over the territory. However, since May 1995, the FRA has required an event recorder on any train operated faster than 30 miles per hour (49 Code of Federal Regulations [CFR] 229.5 and 229.135). Under the requirement a recorder must, at minimum, be tamper resistant and capable of recording the following: train speed, direction of motion, time, distance, throttle position, brake applications and operations, and where the locomotive is so equipped, cab signals during the most recent 48-hours of operation.

In addition, the railroad industry has voluntarily developed other uses of recorders. Recorders allow railroads to verify the remote operation of devices that provide for safe train operations as well as for public safety. Recorders monitor rail-highway grade crossings interconnected for preemption of traffic signals for time, train speed, and activation of preemption circuitry. Selected centralized traffic controlled interlockings use recording systems to record time, sequential position of relays (signals) controlling train movements through an interlocking, and position of the switches in the interlocking. Some systems can record relay positions for related intermediate signals. Railroad wayside-equipment defect detectors can detect certain defects as a train passes over sensors/scanners at track level and can record and send messages to the train crew.

Each of these recording systems can maintain a record of the activity for parameters as prescribed by the railroad. Railroads also voluntarily record radio communications between their dispatchers and train crews as well as the communications among railroad-emergency coordinators, emergency and law enforcement agencies, and other organizations during an emergency. Thus railroads can monitor the dispatchers' instructions to train crews for compliance with the railroad's own rules and with the instructions authorizing train operations. Likewise, the railroads can monitor their communications with outside agencies for effectiveness, timeliness, and accuracy of information provided during emergencies.

3. VOYAGE DATA RECORDERS

Worldwide, there are many places that a ship can sink without anyone being aware of it for days. Integrating a data recorder in the compact environment of an aircraft is one thing, fitting a Voyage Data Recorder (VDR) into a passenger or merchant vessel is something entirely different, and the costs of so doing can be great. In a very competitive and loosely structured international industry there are many owners who see little or no commercial advantage to fitting VDR's. The safety record of some ship owners and flag states (countries) is far from satisfactory. In the past ten years about 1000 merchant ships have been lost and many more have been involved in lesser accidents to varying degrees.

The human toll has been equally horrifying. Shipping, perhaps more than any other industry, is influenced by the realities of the market place with well run, properly manned, modern vessels having to compete with badly maintained, poorly managed, indifferently crewed vessels of excessive age. The well run ship with its greater investment in training and safety is often at a commercial disadvantage when compared with a vessel at the other end of the spectrum where such matters are barely a consideration and the operating costs are significantly less. Accidents can, and do, occur to vessels in any category and sailing under any flag. Leading flag states go to great lengths to establish the causes by fully investigating circumstances and publishing findings for the benefit of all.

Flag states with independent accident investigation organizations are recognized as being the most effective in view of their impartiality and the trend towards making marine accident reports public. Many nations, despite having large parts of the world's fleet sailing under their flags, do little to fulfill the international requirement to investigate marine accidents when they occur. If an investigation is carried out there is, too often, little or no attempt to publish the report and any contribution to improving safety at sea is lost. Marine accident investigation is all about reconstructing events. Unlike aviation where access to data recorders can provide answers to complex questions and establish patterns of human behavior, the marine accident investigator has to rely much more on physical evidence and, crucially, the recollections of those involved. Occasions arise when there is nobody alive to tell the tale and the process of reconstruction becomes even more difficult. Ships sink, sometimes without trace. Such devices will ensure that a true account of what occurred in an accident can be obtained.

The case for fitting VDRs in ships has been made. In July 1997 the Safety of Navigation Sub-Committee of the International Maritime Organization (IMO) approved draft standards for shipborne VDRs although, crucially, agreement has yet to be reached on which ships must carry the recorders and when. The European Community has acted ahead of the IMO requirements to ensure that all passenger ferries operating in Europe are equipped with VDRs to IMO standards. This is just a start but, if in future, VDRs are to be carried by substantially more ships, agreement must be reached in the IMO on carriage requirements and on the text of a suitable amendment to the International Safety of Life at Sea (SOLAS) Convention.

4. PIPELINE DATA RECORDERS

Operating under the jurisdiction of the U. S. Federal Energy Regulatory Commission, interstate pipelines provide a conduit for shipment of petroleum products and natural gas. Gas enters an interstate pipeline from gathering systems and from interconnecting pipelines. Beginning at individual wellheads, gathering systems usually consist of smaller diameter pipe operating at lower pressure. Gas conditioning is usually performed to reduce contaminants such as water from gathered gas before it is compressed into the transmission system. Gas leaves the transmission system through delivery points by flowing into interstate pipelines directly to end users such as industrial facilities, power plants or local distribution companies.

Basic components of an interstate pipeline include steel pipe, valves, compression, processing and storage facilities. Pipe sizes vary widely with much of the pipe in the 20-inch to 36-inch diameter range and wall thickness of about one-quarter to one-half inch. A typical range of operating pressures for a transmission system is 300 to 1440 psig. Powered by natural gas or electricity, compression is one of two types: reciprocating or centrifugal. Processing facilities extract undesirable contaminants (such as hydrogen sulfide and water) and marketable hydrocarbons (such as propane and gasoline). Storage facilities have been developed from depleted oil fields, coal mines, salt domes, aquifers and reefs. These facilities can be used for peak demands and short-term, as well as, seasonal storage of gas. Much of the gas that is transported on interstate pipelines is nominated, that is, scheduled in advance of actual gas flow. Deliveries into local distribution companies that serve weather-sensitive markets, however, cannot be known with absolute certainty. Such demand is met in part with "no-notice" service, which is usually supplied from inventories of the customers' gas, which is stored in the pipeline's storage facilities for monitoring.

5. HIGHWAY EVENT DATA RECORDERS

Motor Vehicle Safety Research Advisory Committee (MSVRAC) consisting of government and industry officials was formed through the sponsorship of NHTSA and initially met on October 2, 1998 to address research requirements for on-vehicle event data recorders. Participants included representatives from NHTSA, FHWA, NTSB, TRB, the major American automobile, truck, and bus manufacturers, and several other vehicle manufacturers. The Task Force members recognized issues regarding liability and privacy. The objective offered by NHTSA for the task Force was to facilitate the collection and utilization of collision avoidance and crash worthiness data from on-vehicle event data recorders (EDR). The scope was limited to research rather than regulatory initiatives. Current EDR systems are considered to be early generation systems with enormous potential for collecting and using pre-crash, crash, and post-crash data. EDR's are defined as devices capable of gathering, storing and displaying data elements from a vehicle in motion as pre-crash, crash and post-crash.

Event data elements include but are not limited to active suspension measurements, advanced systems, air bag inflation time, air bag status, airbag on/off switch position, automatic collision notification, battery voltage, belt status of each passenger, brake status-service, brake status-ABS, collision avoidance, braking, steering, etc., crash pulse-longitudinal, crash-pulse lateral, CSS presence indicator, speed change or ΔV longitudinal, ΔV lateral, ΔV vertical, electronic compass heading, engine throttle status, engine RPM, environmental conditions such as ice, rain, temperature, headlamp status, GPS location data, number of occupants, Principle Direction Of Force (PDOF), PRNDL position (gearshift: park, reverse, neutral, drive, low), roll angle, seat position, stability & traction control, steering wheel angle, steering wheel tilt position, steering wheel rate, time and date, traction coefficient calculated from ABS computer, turn signal operation, vehicle speed, VIN, wheel speeds, windshield wiper status, yaw rate, ignition-key cycle count, vehicle movement time, location at start, velocity at crash, trip time at collision, air bag deployment, and deployment algorithm data.

EDR FOUNDATION

Over 40,000 people are killed annually in highway accidents in the United States. Transport Canada identifies for 1997 that 152,689 casualty collisions were recorded with 3,064 fatalities and 221,186 injuries. Fatalities include 1,569 drivers, 822 passengers, 403 pedestrians, 120 motorcyclists and 67 bicyclists.

The exact cause of a collision is often unknown and requires expertise by an accident reconstructionist just to figure out what happened in the driver, vehicle, and environment interface. Therefore, some conclusions relating to the safety afforded by the vehicle to an occupant cannot be made. In addition, hazards in the highway environment are often not discovered due to the lack of information. Accident reconstruction is a tool commonly used by the National Transportation Safety Board (NTSB) or other agencies to investigate an accident sequence, but data elements are often lacking and accurate reconstructions are difficult and time-consuming. Because many assumptions are made in this process, the reconstruction is not exact, making it difficult to accurately predict occupant kinematics and to identify potential safety hazards within a vehicle or the highway system. EDR's would eliminate or reduce much of the guesswork involved in reconstructing accidents, ultimately enabling a more accurate assessment of occupant injuries, driver performance, and safety hazards within and around a vehicle.

DRIVER & VEHICLE DATA: MECHANICAL

The tachograph is a mechanical data recorder originally invented in the 1920's representing a combination of clock, speedometer, odometer, tachometer, and data recorder. The name tachograph comes from the graphical recording of tachometer or engine speed. The tachograph typically will track speed, RPM, distance traveled, and certain systems can also track up to three other status events such as key on or off, doors opened or closed, use of emergency sirens and lights or other important functions. On some units a driver warning light may be activated when the user-defined speed limit is exceeded.

In almost all vehicles, there is a direct correlation from engine speed to vehicle speed given transmission gear ratios, axle gear ratios and tire & wheel size as measured in revolutions per mile or kilometer. Argo and VDO are two long time manufacturers of this type of equipment. Many units are built so that they install in the dash directly in front of the driver, next to the vehicle speedometer. Recordings are done on graph paper, most often installed from the front of the unit. An ink pen typically records engine speed, vehicle speed and distance on circular graph paper that is automatically advanced according to the internal clock of the tachograph. Graph paper is removed on a regular basis and maintained by the fleet for record keeping.

DRIVER & VEHICLE DATA: ELECTRONIC

Moving forward from the tachograph, to today, when much more information is electronically available provides a basis for vehicle utilization. Fleet Management Systems collect driver performance and vehicle operation data and provide output reports, enabling objective tracking of driver performance and vehicle operation. Monitoring helps to verify the driver's time sheet. FM systems provide reports that document start time, pickups, time at stop, and driver habits. With police or EMS vehicles critical functions like sirens and warning beacon activation are documented.

Information collected by the system can be used to maintain regular maintenance schedules to further increase vehicle life and control costs.

Electronic data records both driver inputs and vehicle outputs. Important inputs would/could include steering angles, application of brakes and throttle, gear selection, engine braking, use of lights, turn signals, cruise control, wipers, and horn. Time based inputs would be recorded at various increments prior to and during the accident sequence. Information is also important regarding restraint use and occupant seating location. Desirable vehicle parameters include pre-impact speed, engine rpm gear selection, acceleration history, braking rate, cruise control, anti-lock braking systems, and activation of passive restraints.

In some FM systems each driver in the fleet is given a Data Key which is coded to the particular driver. When the drivers start work, they log on to the vehicle with the key. In this manner, each driver is appropriately identified by the vehicle's FM computer.

COLLISION ANALYSIS: TRADITIONAL

Typically in highway collision analysis, driver inputs and vehicle outputs are derived from witness statements and physical evidence such as point of impact, tire marks, and point of rest for each vehicle. However, witness statements are frequently in conflict or biased therefore providing data to the reconstructionist which is not completely accurate pertaining to potentially relevant issues such as initial over the road speed or speed at impact. Furthermore, a collision typically occurs within 1/10 of a second or 100 milliseconds, a time frame which witnesses cannot necessarily and accurately assess vehicle collision interaction. Unfortunately for the reconstructionist, physical evidence can be limited if road conditions are not ideal or if the evidence is not collected immediately and properly after a collision.

NTSB CHALLENGE FOR EDR

In 1997, the National Transportation Safety Board (NTSB) made two significant recommendations on crash recorders in an attempt to bring together government and industry.

> To the National Highway Traffic Safety Administration (NHTSA):
>
> • H-97-18 "Develop and implement, in conjunction with the domestic and international automobile manufacturers, a plan to gather better information on crash pulses and other crash parameters in actual crashes, utilizing current or augmented crash sensing and recording devices."
>
> To Domestic and International Automobile Manufacturers:
>
> • H-97-21 "Develop and implement, in conjunction with the National Highway Traffic Safety Administration, a plan to gather better information on crash pulses and other crash parameters in actual crashes, utilizing current or augmented crash sensing and recording devices."

NTSB's position is that EDR data could be used in a comprehensive manner. Systematic capture, analysis and organization of crash recorder data will enable the public, all levels of government, automobile manufacturers, insurance and health care industries to contribute to the building of a safer transportation system based on a scientific foundation of objective data.

MVSRAC & NHTSA EDR Working Group

In 1998, NHTSA requested that its Motor Vehicle Safety Research Advisory Committee (MVSRAC) approve a working group for Event Data Recorders under its Crashworthiness Subcommittee. The Working Group consisted of representatives from the motor vehicle industry, academia, federal and state governments. NHTSA's MVSRAC Working Group meetings were closed to the public. MSVRAC's mission was to collect facts and report them to the parent Subcommittee. The Subcommittee and full committee meetings are open to the public. The Working Group invited experts to assist in the fact finding mission and maintains a public file.

Technical objectives of the Working Group included: 1) defining functional and performance requirements for event data recorders, 2) understanding present technology, 3) developing a set of data definitions, 4) discussing various uses for the data, 5) considering related legal & privacy issues, and 6) standardization of publicly usable data.

On May 31, 2000 the charter for the MSVRAC committee expired. NHTSA Office of Research and Development hopes to reconstitute the committee in the future under a new charter. Until this is done the Working Group function is to gather factual information and not to develop consensus recommendations for NHTSA or any other Federal agency, the group's work may continue and need not be conducted as part of a sanctioned advisor committee.

June 8, 2000 was the NHTSA Research and Development Inaugural Truck and Bus Event Data Recorder Meeting http://dms.dot.gov/search and search Docket Number NHTSA-2000-7699.

GM TYPE I EDR

The National Transportation Safety Board has recommended that automobile manufacturers and the National Highway Traffic Safety Administration work cooperatively to gather information on automotive crashes using on-board collision sensing and recording devices. Since 1974, General Motors' (GM) airbag equipped production vehicles have recorded airbag status and crash severity data for impacts that caused a deployment. Many of these systems also recorded data during "near-deployment" events, i.e., impacts that are not severe enough to deploy the airbag(s). GM design engineers have used this information to improve the performance of airbag sensing systems and NHTSA researchers have used it to help understand the field performance of alternative airbag system designs. Beginning with the 1999 model year, the capability to record pre-crash vehicle speed, engine RPM, throttle position, and brake switch on/off status has been added to some GM vehicles. This paper discusses the evolution and contents of the current GM event data recording capability, how other researchers working to develop a safer highway transportation system might acquire and utilize the information, and the status of the NHTSA Motor Vehicle Safety Research Advisory Committee's Event Data Recorder Working Group effort to develop a uniform approach to recording such data.

Evolution of GM Event Data Recording

In 1990, GM introduced a complex Diagnostic and Energy Reserve Module (DERM) with the capability to record closure times for both the arming and discriminating airbag deployment sensors as well recording vehicle fault codes present at the time of deployment.

data and provides a precise and objective basis for reconstructing traffic accidents. It works like the

With the 1994 model year GM introduced a solid state Sensing & Diagnostic Module (SDM) incorporating analog accelerometer with an integrated computer algorithm. The SDM also computed and stored the change in longitudinal vehicle velocity or Δ Vee (DV) during impact to provide an estimate of crash severity. Certain 1999 model year GM vehicles have the added capability to record vehicle systems status data for five seconds prior to impact. Vehicle systems monitored include speed, engine RPM, throttle position, brake switch on/off status. GM expects to ultimately include this data on all production vehicles over the next few years.

GM selected Vetronix Corporation to develop software and appropriate interface cables permitting EDR data to be downloaded into conventional laptop computers. Pertinent EDR data can be stored and displayed in a uniform format incorporating accident reconstruction engineering units.

http://www.vetronix.com/main.html

FORD TYPE I EDR

Ford's EDR system introduced with the 2000 models, specifically Taurus and Sable includes longitudinal and lateral accelerometers in addition to two stage airbags and safety belt pretensioners. Depending on seat position, ΔV, and other inputs the controller can select driver or both driver and passenger airbag deployment. At this time a field EDR reading system is not available. Ford Motor Company should be contacted directly concerning download of data from subject vehicle EDR's.

This sophisticated system is addressed in the power point slide presentation compiled from information presented at the February 28, 2000 EDR Working Group Meeting.

General Type I Data Elements

- Time
- Location
- Direction
- Velocity
- Occupants
- Seat Belt Usage

TYPE II EDR -- VDO's HISTORICAL PRECEDENT

VDO's UDS System is currently the "de-facto standard" for Type II EDR's. This device was the first of its type and has been in development in Europe since the 1980's and has been installed for research purposes in both European and American fleets in the 1990's. This device records accident data and provides a precise and objective basis for reconstructing traffic accidents. It works like the "black box" found in airplanes, electronically recording the vehicle's movements. Organizations to include police departments, ambulance services, and private fleets using the UDS have experienced a significant reduction in accident rates, damage claims, and operational costs.

The VDO UDS System registers the vehicle's speed, records transversal, and longitudinal acceleration, and changes in direction at the rate of 500 times per second. In addition to recognizing the length of operation for ignition, brakes, indicators, and lights, the system can also record special functions such as use of sirens and flashing lights on emergency vehicles. When the UDS is in operation, the data recording is continuous. In the event of an accident, the system automatically and permanently stores 45 seconds of data: 30 seconds before and 15 seconds after the accident. When an accident is recognized, the device emits a signal that can also be used in other applications such as signalling the vehicle's logistics system or incorporating in emergency signal management. Up to three separate 45 second events can be recorded. There are three storage registers in the VDO EDR. During a 200 ms crash window the unit records at the rate of 500 times per second to provide detailed collision data. Reference to the power point slides addresses this technology.

http://www.vdona.com

TYPE II EDR: EYEWITNESS & LMS

Eyewitness DriveCam features a windshield mounted black box with digital camera. When activated by x and y axis accelerometers, this device electronically stores 20 seconds of video. DriveCam is a self-contained digital video, audio, and G-force black box / event recorder. DriveCam is designed to record the 10 seconds before and the 10 seconds after an unexpected event such as erratic driving or a crash. It can also be triggered manually to capture road rage or to capture other highway data.

After the DriveCam is triggered, it stores recorded video, audio, and G-forces into a tamperproof digital memory. The recording of the events may then be replayed on a camcorder, television, or laptop computer. DriveCam will replay everything the driver could see, hear, and feel (G-forces) in the time surrounding the recorded event.

DriveCam is designed to record the 20-second period surrounding an event and may be triggered by one of three means: crash, erratic driving and manually triggered.

http://www.drivecam.com

LMS MACBOX is the Loss Management Services system. This robust technology also incorporates forward facing video in addition to x and y axis accelerometers. When an event occurs, such as aggressive braking or acceleration in addition to a crash, the system automatically sends vehicle data to a database using cellular technology. Encrypted video and EDR data from the vehicle can then be accessed through the internet by authorized parties.

The system, called the MACBOX® (Mobile Accident Camera), is for the purpose of securing valuable digital images from the driver's perspective. The images are captured within a sixty-second window. The sequence of image events can be altered according to the needs of the user or controlling party. That is, prior to, point of impact and post crash. In a typical crash scenario the system would have secured real time crash information, which is encrypted and transmitted over a secured intra-net or extra-net. The data is then stored in a repository center for future use by a governmental body, local law enforcement, insurance company or self-insured entity. The system's intent is to provide a secured uniform data distribution center for crash information with real time crash events.

http://lmstechnologies.bizland.com